Chapter Five

Discursive Structure of the Scientific Public Sphere: The Journalistic Production of Science News

1. Introduction

According to the deficit model of the public understanding of science, journalists often 'distort' science for a variety of reasons. The media in general and the newspapers in particular are considered to be interested in 'sensationalism' and journalists are always blamed for their poor understanding of science. On the contrary, the cases we have discussed in the previous chapters reveal an entirely different dynamics in which the regional press is actively involved. As we have seen, the regional press plays a role in creating a space for articulating a critique of modern science and its knowledge production practices.

This chapter examines the active role of the regional press in the production and maintenance of the scientific public sphere. As mentioned in the first chapter, the scientific public sphere is not a neutral space where anything can be spoken; rather it is a space which is discursively structured. The actors and their utterances in the space are regulated by a 'backstage' that makes possible the deliberations on the front stage. While discussing the case studies, we mainly focussed upon the deliberations on the front stage. This chapter attempts to examine the structure of the scientific public sphere as a whole. The main focus of this chapter will be on how the back stage shapes the front stage. Thus, instead of looking at the journalistic production of science news as either distortion of science or a neutral activity, scientific news production will be conceived here as complex activity in which the journalists are part of a very dynamic backstage that makes possible the 'performances' on the front stage of the scientific public sphere. At the same time, the individual newspapers and the journalists appear as actors on the front stage as well.

The chapter explores the structural characteristics of the scientific public sphere and the complex dynamics behind its construction, focusing on the journalistic production of science news. The first part of the chapter will look at the discursive strategies used by the regional press in presenting news. The following section will discuss the backstage activities in detail; that is, the production of science news. The final section will probe the relationship between the front stage and the backstage.
a nutshell, the intention of this chapter is to understand the discursive structure of the scientific public sphere.

2. Discursive Strategies

Newspapers use different discursive strategies to present news effectively to the reader. The skilful use of different news genres such as editorials, editorial page articles, letters to the editor etc., help newspapers to stage or present the news according to their editorial policies and politics. An inquiry into these strategies is important for understanding the tacit interests and politics of the newspaper establishment, and it helps us understand how the newspaper acts as an active gatekeeper in presenting science news to the reader. The discursive strategies discussed here are not exclusively used in the production of science news, but are part of the journalistic paraphernalia in general. Here we examine only those techniques and tools the newspapers employed in the production of news in the context of the scientific controversies.

2.1. Presentation of the News

Newspapers prioritise news according to their interests and politics. The importance of the ‘event’ is indicated by the space given to it in the newspaper. The event either receives more attention in the subsequent days or slowly dies out on account of several factors depending on the alignment of the news. This is quintessential in determining the course of the event in the scientific public sphere. The various techniques employed by the press to present the news have a crucial impact on the readers and this was quite evident in the scientific controversies we have examined.

The first case study clearly depicted a specific pathway in the alignment of news reports. The deliberations began in the regional press with the portrayal of a

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1 According to Lee and Lin (2006: 336), a discursive strategy can be broadly defined as “the use of language and linguistic devices to respond to a political situation to alleviate pressure, avoid risk and/or curry favour”. In the context of scientific controversies, newspapers employ different discursive strategies to bring in or erase the internal ambiguity and ambivalences of the regional research system.

2 There are several studies which examine the discursive strategies of and textual structures in newspapers in different contexts. See for example, Bekalu 2006; Calsamiglia and Van Dijk 2004; Erjavec 2004; Higgins 2004; Myers and Caniglia 2004; Rosie et al. 2004.

3 Here the terms ‘incident’ and ‘event’ have distinct connotations. The former denotes a ‘happening’ that occurs at a site outside the scientific public sphere, a natural phenomenon for example. The latter is defined as the discursive construction of a happening within the scientific public sphere. The emergence of an event in the scientific public sphere and the deliberations triggered off by it presupposes a complex discursive process.
particular event; all the newspapers reported the tremor that struck the region on 12 December 2000. The event was constructed on the basis of a set of discourses which already existed. This repertoire of discourses involved a scientific understanding of the destructiveness of the earthquakes, the fear that Kerala was a region that was earthquake prone, the discourse about the environmental crises the region was facing, anxieties regarding risk and disasters and so on and so forth. The social memory of similar tremors in the region as well as massive and destructive earthquakes that occurred in other parts of India and the world were readily available as powerful resources for the construction of the event. When the 12 December tremors occurred, all the newspapers under study presented it as front-page news, supported by a variety of news reports and journalistic essays on the main page as well as other pages. These were supplemented by reports of local experiences of tremors from different districts, explanations and warnings from scientists and disaster experts, reports on the functioning of the government machinery, past events of tremors in the region etc. Photographs were widely used to create a visual impact.\footnote{A detailed discussion of the use of visual images will be undertaken elsewhere.} The sudden staging of an event was evident in the case of the coloured rain controversy as well.\footnote{The whole course of deliberations regarding the coloured rains started all of a sudden after the first incident of red rain in Changanacherry, as we have seen in chapter 3.}

However, the case of RCC differed in terms of news production. The news about the clinical trial was first reported as a trivial issue in the local news pages of the papers. The priority accorded to the episode was influenced by at least three crucial factors: first, the fact that the issue was initially aired by a television channel as an exclusive story. Consequently, none of the newspapers wished to promote it or provide unnecessary media mileage to the channel. Secondly, RCC is a major research institute in the region with great public trust and appreciation, whose director was a powerful scientist-cum-administrator. None of the newspapers ever wanted to touch the institution, as it would badly affect the reputation of the newspaper—an indicator that the reputation of research institute prevailed over that of the newspaper. Thirdly, the journalists and the newspaper owners did not perceive it as a significant issue to be presented in the main pages. The dearth of a repertoire of available discourses and social memories linked to medical research may have hindered the
sudden surfacing of the issue in the regional press.\textsuperscript{6} The episode was first reported mostly in the local pages of the Thiruvananthapuram edition of the newspapers, and the controversy gradually became significant enough to be reported in the main pages.

The closure of the controversy and its fading from the attention of the newspapers happened in a similar fashion. For instance, the closure of the first case was partially determined by the shifting focus of the regional press from the occurrence of the geological phenomena in Kerala to the realm of international politics following the demolition of the World Trade Centre towers on 11 September.\textsuperscript{7}

As a result, reports on the geological phenomena in the region were relegated from the main to the local pages, causing the gradual demise of the issue. The trajectory of the coloured rain dispute as well as the RCC clinical trial controversy was similar; the news reports decreased in number due to erosion of their 'newsworthiness' and disappeared from the main pages, and then slowly vanished altogether.\textsuperscript{8}

The local pages appeal to an important segment of the readership. These pages are set up so as to create debates on local issues, and also to capture and enhance the local manifestation of an event (Jeffrey 2003). As we have seen in the case study chapters, the local pages were active sites of negotiations. The newspapers often used the local pages in a tactical manner to regulate the deliberations. The RCC case stands out as a unique example. Some of the newspapers attempted to prevent the outbreak of a dispute regarding the clinical trials and sought to restrict the deliberations to the local pages of the Thiruvananthapuram edition in the beginning.\textsuperscript{9} The strategy initially helped the newspapers to contain the eruption of the polemic to the locality where the RCC is situated, but they could not escape reporting the development of the controversy during the later phase. The activation of the scientific public sphere in the local editions gradually opened up the debate and snowballed into a regional controversy. The fire-fighting of the newspapers completely collapsed at this stage and the regional press was forced to report the controversy to a general readership.

\textsuperscript{6} It is quite interesting that the past experiences were hardly invoked by the newspapers in connection with the clinical trial controversy. It shows that the incident of the RCC clinical trial was a fresh experience for the publics of Kerala, unlike the earthquake.

\textsuperscript{7} See chapter 3.

\textsuperscript{8} The journalists who were interviewed generally suggested that the demise of one issue after some time in the newspapers occurred when the readers lost their enthusiasm in the issue. When the deliberations reach this stage of reader disenchantment, the importance given to the event in the newspaper also decreases.

\textsuperscript{9} See the section on 'selective blackout' below.
rather than containing the news to the local edition. Although the newspapers had their own interests that urged them to contain the controversy, they completely failed in their attempt, since the activation of the scientific public sphere took the controls away from the media.

2.2. Amplification

The newspapers used different strategies to ‘amplify’ the issues under deliberation, when the journalists anticipated its ‘newsworthiness’. The technique of amplification was widely used to emphasise an issue and thereby increase its significance and to woo more public attention. When the tremors occurred, the newspapers presented the destruction caused by the quakes and the public’s experience of the same in order to increase the impact of the incident on the reader. Similarly, when the well collapses and the coloured rains occurred in the region, the local manifestations of the phenomena and the local public’s response to it were widely reported. Local incidents and experiences were connected and amplified, lifting them to the status of great regional importance. The process was not unidirectional. The local public relied on the regional press to make sense of the local experiences by linking them with similar incidents reported from other localities and the experience of people from other locations. They also relied on the regional press to make sense of the scientific explanations and the disputes and ambiguities concerning local incidents and issues. The effective utilisation of the regional press as a source of information helped the public analyse local incidents in a skilful manner, bridging their expertise and experiences with the resources provided by the newspapers. This precipitated in local political action, as in the case of the fuming hill at Idinjimala.10 This strategy helped in connecting the local experiences and created a sense of solidarity among the publics.11

Similarly, in the case of the RCC controversy, the newspapers amplified the issue by drawing in a variety of responses to the clinical trial. The demonstrations and public meetings carried out by different organisations at different places were brought together by the regional press. Similar cases of clinical trials and related events from

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10 See chapter 2.
11 For a discussion on similar instances of the media bridging isolated hamlets and stranded individuals and providing ‘emotional support and companionship’ to the publics and thereby creating a community in the context of disasters, see Perez-Lugo 2004: 213.
all over the world were reported and blended with the regional controversy. In like manner, when unusual geological phenomena struck the region, a wide range of similar incidents from various parts of the world had been reported in the regional newspapers—this was also a way of naturalising an unfamiliar occurrence. In the case of the unusual geological phenomena, parallel occurrences of earthquakes and volcanic eruptions from other parts of the world were reported without explicitly linking them with the regional event, whereas in the RCC controversy, public disputes on clinical trails from the West were explicitly integrated with the regional case.

Another kind of amplification technique used in the regional press was the endeavour to bring in a wide range of experts to the scientific public sphere as actors, who were otherwise not directly associated with the dispute. This strategy was effectively used by the Malayala Manorama when it appointed its own expert team to investigate the phenomenon of well collapses in the region. In the case of the tremors, newspapers made similar attempts by quoting existing studies and the explanations delivered by reputed scientists in other contexts. In the same vein, the Mathrubhumi published the opinion of well-known environmental activists like Medha Patkar and Vandana Shiva in its attempt to suggest environmental destruction as causing increased seismic activity in the region. This attempt of bringing in actors from different backgrounds amplified the event by catalysing the process of deliberation.

The newspapers also evoked social memory to construct a legitimate ‘past’ for the event. This mode of amplification has been effectively used in the case of the tremors, well collapses and coloured rain episodes. The newspapers published past experiences of earthquakes and coloured rains by quoting old news reports, historical sources and old scientific databases. Many actors also contributed to this process of reinventing the past.

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12 See chapter 4 for a detailed discussion on the clinical trial controversy that appeared in Washington Post, and the way it was linked to the RCC dispute.
13 For example, newspapers quoted the study of Dr. Harsh Gupta many times in different contexts in support of the RJS theory. The research of Chinese scientists was quoted quite often to argue that earthquake prediction was not impossible.
2.3. Selective Blackout

Sometimes newspapers used a strategy which was quite the opposite to the technique of amplification. In the case of the RCC controversy, this strategy was widely used in the regional press: let us call it 'selective blackout'. The newspapers never permitted certain issues and events they published to erupt into a controversy or public debate, particularly when they reckoned that it went against their interests or politics. As we have seen in the previous chapter, the RCC clinical trial was an issue that was selectively blacked out in its first phase by the regional press. The competition and rivalry between the newspapers were important factors influencing the news blackout. When the *Malayala Manorama* commissioned its own research team to investigate the well collapses, no other newspapers considered it newsworthy, and completely ignored the matter. The selective blackout strategy was crucial in attaining closure. The deliberation of a scientific controversy was often curtailed by selective news blackouts. As we have seen in the case of the coloured rain controversy, when the alien cell theory gathered momentum, the regional newspapers stopped reporting actors who opposed the thesis, and the issue slowly died out. Selective blackout can be considered as a strong gate keeping mechanism employed by the regional press.

2.4. Narrative Techniques

The narration of the events in the newspapers is significant for understanding the discursive structure of the scientific public sphere. The major narrative strategies employed in structuring the news text are discussed here.\(^1\)

2.4.1. The Montage

A key narrative technique used was the montage style of reporting. Montage is a film editing technique wherein different footages are spliced alternatively to create a unique visual impact.\(^2\) In a similar manner, the newspapers presented two or more different and often contradictory arguments within a single narrative. The technique

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\(^1\) A detailed textual analysis using techniques such as Critical Discourse Analysis (CDA) is beyond the scope of the thesis, although the analysis in the chapter is inspired by the framework. For textual analysis using the CDA framework, see Bhatia 2006; Bekalu 2006; Calsamiglia and van Dijk 2004; Erjavec 2004; Lee and Lin 2006; O'Mahony and Schafer 2005; Pounds 2006; and Yamaguchi and Harris 2004.

\(^2\) Montage was first used by Sergei Eisenstein in the film 'Battleship Potemkin', and the famous 'Odessa steps' sequence in the movie is a good example for this kind of editing. For detailed description of the montage technique, see Eisenstein 1991 and Smith 2004.
was often used in the case of scientific controversies to dispute the perspective provided by a scientist or an actor of greater authority, by counterpoising it with less authentic claims and explanations. For instance, news reports about the recurrence of a geological phenomenon in Kollam district that appeared in the Madhyamam skillfully employed the technique of montage to de-legitimise the argument of the CESS scientists that the micro tremors were harmless. See the text of the news report: 17

1. The tremors that have been continuing in the district [of Kollam] for more than one week appeared yesterday also at different places.
2. In spite of the expert opinion that the tremors are harmless, there are reports that the district is earthquake prone.
3. A team of experts will visit the tremor-stricken places again, today.
4. The indications of the earthquake first appeared on the night of 9th [February 2001]. Water oscillation was observed in the well in the household of . . . [name and address of the house owner]. The water level in the well was rising and cracks on the walls of the house were noticed. . . . By Saturday such signs of earthquake have spread to nearby places . . . .
5. By Monday the situation worsened and the public panicked when indications of tremors appeared in other places too [name of the places].
6. The expert team under the leadership of Dr. M. Baba, the director of the CESS, visited the affected places.
7. The experts opined that these were not tremors [Bhoochalanam] but seismic vibrations [Bhouma Kampanam].
8. However, hundreds of houses were damaged in almost all parts of the district in the following days.
9. Wave formation in wells was observed in all these places.
10. A few days ago, those who inhaled the gas being emitted from the well of . . . [name and address of the house owner] where wave formation had previously been noticed experienced dizziness.
11. The gas is conjectured to be radon, an inert gas which is not poisonous but is emitted from the earth in certain places prior to the earthquake.
12. However, no tests have been conducted to identify the gas.
13. It was officially informed that scientists [name of the two scientists] from the CESS would examine the damaged houses as well as those wells wherein water oscillation were observed.

14. However, it had been clarified to the representatives of the public the other day that there was nothing to worry about the tremors. The public was also informed that the phenomena would continue till the plates rearranged themselves and re-stabilised.

15. It has been proved by several studies that the emission of the radon gas is an indicator for earthquake forecasts. In 1966, a similar incident of radon gas emission had been observed in water bodies in China just before an earthquake.

16. Radon gas is commonly found under the earth in those places where radioactive minerals are present in the soil.

17. The presence of radon gas in Kollam district is explained by the presence of karimanal in large quantities.

18. Kollam district is already included in the list of earthquake-prone regions published by the National Geographical Research Institute.

The opening sentence is the description of the incident [1]. A scientific institution such as the CESS argued that tremors were not dangerous, but the statement was challenged in the same sentence [2]. The source of the counter argument is not tagged anywhere in the text. The next sentence [3] states that the CESS team is revisiting the location, showing that the scientists reconsider their earlier opinion regarding the harmlessness of the tremors. The next two sentences [4 and 5] are actually in continuation of the first sentence [1], further suggesting the gravity of the event, and then the narrative again moves to the details of the first visit of the team of the CESS scientists [6]. The scientific explanation of the CESS team is further explored in the next sentence, but without explaining the scientific terms mentioned, enhancing the ambiguity of the scientific argument [7]. The narrative again shifts to the phenomenon [8] and points out the origin of the new phenomenon of water oscillation in wells [9]. From the next sentence onwards the entire narrative shifts to the emission of radon gas [10, 11 and 12]. The gas emission from the wells is presented as a refutation of the conclusions of the CESS scientists. It is also implicitly insinuated that the CESS scientists were yet to investigate this phenomenon [12]. Further, the source of the scientific explanation regarding the radon gas emission is not given [11]. Then the narrative again cuts to the proposed visit of the CESS scientists [13]. The stubbornness of the CESS scientists is implied in the next sentence, since the report suggests that the experts were reiterating the official stance despite the widespread occurrence

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18 Karimanal is the beach sand which contains minerals such as ilmenite, rutile, zircon, monazite, leucoxene, sillimanite and garnite. Many of these minerals are radioactive. This naturally radioactive mineral-sand is largely found on the seashores in the Alappuzha and Kollam districts of the state.
of the phenomenon [14]. The news report contrasts the ‘rearrangement of plates’ explanation proposed by the CESS scientists with the radon gas emission argument in the next sentence by narrating the Chinese experience [15]. A new problematique is then introduced: the presence of Karimanal in Kollam district as an indicator of the presence of radon gas [16 and 17]. The concluding sentence of the news report introduces the finding of another scientific institution whose scientific authority superseded that of the CESS, further de-legitimising the official scientific explanation provided by the CESS [18].

The narrative analysis of the news report shows how the newspaper tacitly destabilised the dominant argument put forward by the CESS through the insertion of parallel descriptions. This subversion was accomplished by contrasting different narratives which were often contradictory in nature. The montage technique is applied in the news reports inadvertently: such news reports are often the creation of the editorial desk from a couple of journalistic write-ups. While mixing up, these accounts are rearranged (and misinterpreted) by the news editors at various levels. And the outcome of this editorial job is a new narrative which is heterogeneous and often self-contradictory.

While the news report being discussed above is the result of the passive employment of the montage technique, the report that appeared as an editorial page article in the Malayala Manorama stands for conscious use of the same. The narrative was presented in a form where three scientists answered the questions posed by the newspaper. The news report was in the form of an interview, each question being followed by three answers. This form of narrative helped create a debate between the three lines of arguments, and the readers could compare and contrast the interpretations of the scientists and draw their own conclusions. This method of montage was effectively used by the same newspaper in the RCC controversy too. A related style of montage was inter-textual in nature. For instance, while the CESS scientists proposed the meteor theory of the red rain, all the newspapers presented counter arguments aligned as parallel texts.

19 “Bhoochalanam: Asanka Venda; Enkilum Karuthal Venam”, MM, 19.01.2001, p.8, editorial page article. The scientists quoted were Dr. Kusala Rajendran of the CESS, Dr. B.K. Rastogi from the NGRI and Dr. Mukherjee from the JNU.
20 “Nirodhicha Marunnu Pareekshichuvo?” MM, 01.08.2001, p.4, editorial page article. In this report the arguments of Dr. M. Krishnan Nair and Dr. C.R. Soman have been contrasted. This method of montage appeared in the genre of editorial page articles.
Similarly, when many of the scientists argued that the earthquakes could not be predicted, the newspapers contrasted it with explanations from those scientists who emphasised the predictability of the earthquakes.

2.4.2. Public as Reference Point

The news narratives are often constructed with reference to a ‘public’ who is conceived as the general public of Kerala. All the actors frequently referred to this ‘public’ in their deliberations. The news reports generally spoke for this imagined public. The image of the public was invoked in the negotiations in a number of ways. In certain instances, victimhood was attributed to the public. In the discussion on red rain in Changanacherry, the local public was considered witness of the phenomenon and as the provider of first hand information about the phenomena experienced. There were also instances of the public portrayed as experts, posing serious questions regarding science and frequently confronting scientists and government officials: here, the public appears as a political agent to be heard and seriously acknowledged.

2.4.3. Discourse Frames

News reports were built around ‘discourse frames’, that is, to argue a point, the newspapers evoked already existing discourses. The most general frame used was the environmental discourse. While the Mullaperiyar dam issue was deliberated, this frame served the purpose of conferring legitimacy upon the argument of various actors. The frame was widely used in the context of the RIS

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21 See chapter 1.
22 In such cases, the public appeared as ‘suffering’ in various ways. For instance, in the negotiations over the Mullaperiyar dam issue, the public of Kerala was portrayed as threatened by a bursting dam and the Tamil Nadu Government and its scientists were portrayed as the culprits. On the contrary, the RCC case had a different dynamics in this regard. Since it was a dispute over the clinical trial, the victims were represented as poor, dalit patients. Apparently, this was the only instance of representation of the victim as completely voiceless. Other than Gopal, the patient from Tamil Nadu, nobody else spoke in the scientific public sphere. Even Gopal was conferred with 'the perfect victimhood', represented as a poor, dalit patient from outside the state. See chapter 4.
23 Frequently the newspapers painstakingly reported how the public experienced an incident of earthquakes, well collapses or coloured rain, as we have seen in the case study chapters.
24 The fuming hill incident at Idinjimala (chapter 2) is the best example.
25 Discursive frames are the “abstract cultural codes that are understandable to a large and diverse audience” as defined by O’Mahony and Schaffer (2005:100). In the context of Kerala, the discursive frames can be conceived as a set of ideas and terms that had taken shape over a period of time through a long process of negotiations at various levels. It is through such a long political process that a discursive frame becomes solid enough to function as a ‘frame’ by providing linguistic tools and categories to formulate a narrative. The ‘environmental frame’, for instance, took shape through a decade of intense political struggles and ideological debates around the issue of environmental problems beginning in the second half of the 1970s. See also chapter 1.
debate as well as in the case of the coloured rains. These occurrences were often understood in terms of the increasing environmental destruction in the region. For instance, news reports contending that the coloured rain phenomenon was nothing but acid rain due to the heavy industrialisation of Kochi and nearby areas shared the environmental frame of discourse. Similarly, the frame of regional tension between Kerala and Tamilnadu was widely employed in constructing the news narrative in the context of the Mullaperiyar dam dispute, as we have seen in the second chapter.

The framing of deliberations in this manner facilitated the use of already existing resources to understand the issue under deliberation in novel ways. For instance, when the coloured rain phenomenon was discussed, the use of the environmental frame urged the search for a wide range of new scientific explanations. The environmental issues involved and the solutions provided by environmental science functioned as a general foundation for these otherwise mutually contesting scientific explanations. The act of framing the narratives in this manner enabled the newspapers to mould the news reports easily as the scientific terms and linguistic style were readily available for use. This also helped the readers understand the debate more easily. The casting of the narrative with the help of the linguistic and knowledge resources available within a discourse frame rendered more effective communication possible with the readers, and intensified deliberations in the scientific public sphere. Often, the unexpected introduction of a discourse frame accentuated the interrogation of the dominant scientific interpretations as it helped the actors manoeuvre the readily available resources to formulate a sound and legitimate scientific argument, subverting the existing formulations.

2.5. Authentication

The regional press as well as other actors employed certain strategies to claim legitimacy for their arguments. The newspapers extensively cited scientific sources such as peer reviewed journals, scientific associations, institutions and individual scientists from outside Kerala to authenticate their arguments. The appeal to national and international scientific expertise was an important form of legitimating the standpoint that the newspapers were themselves promoting. The strategy was employed in different ways depending upon the context. Sometimes an official scientific source was quoted, as we have seen in the case of the Mullaperiyar Dam
issue, where the CESS was the main source of authentication. There were many instances wherein, internationally acclaimed peer reviewed scientific journals such as *Science* were quoted to substantiate an argument.\(^{26}\) In the coloured rain controversy, the alien cell hypothesis of Godfrey Louis and Santhosh Kumar acquired the status of possible scientific explanation since the *Malayala Manorama* informed its readership about the researchers’ association with the international community of astrophysicists, and their research collaboration with Dr. Chandra Wickramasinghe and his research institute. Individual scientists from outside the state have always been considered as holding greater scientific authority than the experts from Kerala. Therefore, as we have seen in the case of the controversy concerning the epicentre and intensity of the tremors between the CESS and the research wing of the KSEB, scientists like Rastogi were generously quoted as sources of authentication. Similarly, the Chinese and the Japanese scientists were widely quoted to validate that earthquake prediction was not impossible unlike the regional scientists suggested.

2.6. Genres

The newspapers skilfully used several news genres for presenting their cases. Each genre has its own unique features and argumentative style. The characteristics of actors and their arguments vary as per the genre. For instance, an editorial is totally different from a letter to the editor in terms of argumentative style and textual structure. While in the editorial the newspaper appears as the actor, in the letters to the editor, it is the readers who appear as actors. The newspapers actively utilised different genres to promote its interests as per the need of the moment.

2.6.1. Editorials

All the newspapers examined effectively used editorials to express their take on the controversies and therefore the editorials were persuasive in nature.\(^{27}\) Though often authored by a senior journalist or the chief editor, the editorial goes to the press following a discussion at the editorial desk. While some newspapers published only one editorial a day, some others published more than one editorial on different issues.

\(^{26}\) The reports that appeared in *Science* regarding the RCC clinical trial controversy were widely cited in the newspapers. The appearance of the issue in one of the leading scientific journals (*Science*) immensely contributed to giving legitimacy to the allegations raised by the rival scientists from the RCC.

on the same day. The editorial is supposed to be in conformity with the general editorial policy of the newspaper. The newspaper owner's interests explicitly determine the orientation of the editorials. All five newspapers employed this genre effectively to shape the deliberations in the case of the unusual geological phenomena. On the contrary, editorials were hardly published on the RCC controversy. Many of the newspapers enthusiastically published the readers' responses to the editorial, mostly as letters to the editor.

The editorials recapitulated the content of the news reports that appeared on the previous days. Since the news reports generally followed the editorial policy of the newspaper that oriented the news in a specific direction through specific filtering mechanisms, it was easy for the newspapers to produce a retrospective account. In this manner, the newspapers developed a narrative of the deliberations in the scientific public sphere partisan to the newspaper's interests, and this account formed the subject of half the editorials. The other half of the editorials explicitly articulated the newspaper's standpoint on the issue. When the newspaper published a second editorial on the same controversy, continuity in the argument of the two editorials was maintained. The editorials were thus an important genre that helped the newspaper orient the news published by it in accordance with its editorial politics. The genre functioned as the central mechanism that constructed the newspaper as an actor who actively steered the negotiations in the scientific public sphere.

2.6.2. Editorial Page Articles

As the deliberations over a scientific controversy progressed, the newspapers used the editorial page to publish special essays on related topics. The editorial page articles were largely written by a journalist or a scientist. Interviews with key actors appeared on the editorial page. When the issue under deliberation reached its climax, more than one editorial page article appeared in the newspaper. Sometimes the newspaper announced a long essay on a specific theme which was serialised in the

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28 The Malayala Manorama, Kerala Kaumudi and Deshabhimani generally publish only a single but lengthy editorial a day. Mathrubhumi and Madhyamam usually publish two short editorials per day.
29 Approximately eleven editorials on the issue have been published by the Mathrubhumi, while the Malayala Manorama published eight. The Deshabhimani published six editorials and Madhyamam and Kerala Kaumudi published four each.
30 The selective blackout performed by the regional press could have been the main reason behind this dearth of editorials on the matter. Apparently, only the Mathrubhumi and Kerala Kaumudi published one editorial each in connection with the controversy.
editorial page, mostly written by a veteran journalist.\textsuperscript{31} Such an essay usually provided a detailed clarification of some aspects of the controversy in support of the core argument put forward by the newspaper.

The editorial page articles were rigorously used by the regional press to explain and discuss the scientific aspects of an issue. When the tremors struck Kerala on 12 December 2000, the \textit{Malayala Manorama} published five editorial page articles on different aspects of the earthquake.\textsuperscript{32} Other newspapers also published articles in the same fashion on consecutive days.\textsuperscript{33} Essays written by reputed scientists were published on the editorial page. Sometimes the genre was used to stoke up the controversy by contrasting the arguments of different actors,\textsuperscript{34} thereby suggesting that there was no singular scientific explanation available. The richness of the genre is quite visible as far as the regional press is concerned. The newspapers used the genre to open up debates by revealing different aspects of the scientific issue under deliberation, and used the editorial page articles, as they did in the case of any other controversy, as an instrument to persuade the readers and to articulate the newspaper's standpoint on the matter.

\subsection*{2.6.3. Letters to the Editor}

Letters from the readers are published by all the newspapers on a regular basis in Kerala, as they are in other regions of the country and the world. The 'Letters to the Editor' column of the newspaper is a very important section where the 'reader' appears in his/her own right and intervenes in the deliberations. For the newspapers,

\textsuperscript{31} The series of articles published in the \textit{Mathrubhumi} authored by Sasidharan Mankathil is an example. See Sasidharan Mankathil, "Keralam Kulungumpol", \textit{MB}, 17.02.2001 to 23.02.2001, p.4.

\textsuperscript{32} The main essay was written by a journalist, describing the tremors by situating it within the geological understanding of the region, utilising data from different scientific sources. The essay discussed the collapse of the belief about a safer 'South Indian Shield', the RIS thesis, and the activation of lineaments in Kerala. See B. Ajith Babu, "Chalana Kendram Periyar-Idamalayar Bhramsa Meghala", \textit{MM}, 13.12.2000, p.8. The second essay was written by two reputed earthquake scientists from the CESS, giving the scientific explanation for earthquakes, with an intention to ward off public misunderstandings about earthquakes. Dr. C.P. Rajendran and Dr. Kusala Rajendran, "Bhoochalanam Parakkettukal Uranju Neengumpol", \textit{MM}, 13.12.2000, p.8. These two main essays were flanked by three small articles. The first one explained the purpose and use of the Richter scale, while the second one provided security tips to escape from earthquakes, the last one was a box-news item within the journalistic article and described the ability of animals to understand the oncoming earthquakes. See "Richter Scale: Bhoochalana Vyapthiyude Alavukol", "Bhoochalanan Vannal", and "Mrigangal Neraththe Ariyunnu", all in \textit{MM}, 13.12.2000, p.8.

\textsuperscript{33} A rough estimate shows that more than 57 essays have been published in the regional press in connection with the first case unlike the RCC controversy, wherein only a very few essays appeared on the editorial page.

\textsuperscript{34} See the section on montage techniques.
the column is important as a genre that enables them to create the impression that it seriously engages with its readers and acknowledges their right to comment on the news reports. The readers' letters play more important roles. Quite often, the column is used by the newspaper to give space to the discarded voices and arguments of those who have been omitted from other news genres (Richardson and Franklin 2003: 184). Frequently, criticism against the newspaper itself is accommodated in the columns to create the impression that the newspaper is open towards critiques and that it upholds democratic values and journalistic ethics. However, the ‘Letters to the Editor’ columns are rigorously and carefully edited by the newspapers in conformity with its own conception of its reader.35 “Letters”, as argued by Richardson and Franklin (2003: 184–85), “are selected and edited in accordance with the political identity of the newspaper, the (often only perceived) values and preferences of their buying readership, and other more technical and professional requirements of space and balance. In the selection and placement of letters, newspapers construct debates (or arguments) within and between letters, simultaneously signalling the pertinence of the included letters to the subject being debated and thereby acknowledging and (depending on how the letter is presented) legitimating their contents”. Letters are frequently created, edited and rewritten by the editors in compliance with editorial policy (ibid). Consequently, editorial choice and preferences play a crucial role in the making of the letters (Pounds 2006).

The letters to the editor played a crucial role in the scientific controversies under study. An analysis of the letters that appeared in the regional press reveals that the reader was never presented as passive and ignorant. Instead, the letters to the editor were authored by an active reader public with varied expertise. The nuanced editing of the column enabled the newspaper to create the impression that the readers' voices were duly spaced in an unmediated fashion. Scientists and other actors frequently wrote letters, articulating their opinion regarding the dispute. Thus, the genre was used by the regional press as a space to accommodate alternative views on the issue under dispute. In the case of the unusual geological phenomena, the Letter to the Editor column was intensively used to provide alternative scientific explanations.

35 Sometimes, the ‘Letters to the Editor’ column is edited in such a way that different editions of the same newspaper on the same day have different versions of the column. This edition-specific editing of the column helps the newspaper include more readers’ letters. Personal interview with D. Sreejith (Staff Correspondent, Mathrubhumi), 11.12.2006.
and to challenge the arguments of the main actors in the scientific public sphere. The columns also made explicit the rivalry between experts, as the scientists who never had an opportunity to express their views in the newspapers attempted to do so in the column.\textsuperscript{36} Apparently it was the \textit{Malayala Manorama}, \textit{Mathrubhumi} and \textit{Kerala Kaumudi} which effectively utilised the Letters to the Editor columns as a powerful tool to construct the debate.\textsuperscript{37} These newspapers used the column to express their own views in the name of the reader, as we have seen in the RCC controversy. The Letters to the Editor columns in the regional press make it clear that the reader was acknowledged and represented as active and political by the regional press.

\subsection*{2.6.4. Visual Images}

Visual images were quite often used in the regional press to have an added impact by increasing the verity of the news. The presentation of photographs and illustrations including graphs, diagrams and maps enhanced the readability of the articles. While the RCC case was reported with the aid of only the photographs of some of the actors,\textsuperscript{38} in the case of the strange geological incidents the visual images of a wide range were utilised by the regional press. The scientific images were collected from different sources and published with journalistic descriptions as part of news reports and scientific articles in the newspapers. While reporting the earthquakes the newspapers published regional maps showing the epicentre, lineaments, past earthquakes in the region and so on.\textsuperscript{39} The seismograph of the tremor was presented

\textsuperscript{36} For example, see the letter from a former scientist of the CESS, criticising the CESS scientists. Dr. M. Manikantan Nair, Thiruvananthapuram, “Bhoochalanathil Kulunganna Sastrajnjar”, \textit{MB}, 13.01.2001, p.4, letter to the editor.

\textsuperscript{37} In connection with the controversy over the unusual geological phenomena, more than seventy letters have been published in the regional press, which almost 90 percent of the letters appeared in these three newspapers. \textit{Malayala Manorama} published 25 letters, while \textit{Mathrubhumi} and \textit{Kerala Kaumudi} published 18 letters each. In the RCC controversy, \textit{Kerala Kaumudi} published 12 letters while \textit{Mathrubhumi} published 6. The other three newspapers under analysis either published nominal number of letters or completely ignored the genre.

\textsuperscript{38} See for example the photographs of Dr. Krishnan Nair and Dr. C.R. Soman in “Nirodhicha Marunnukal Parisodhichuvo?” \textit{MM}, 01.08.2001, p.4. Mr. Gopal photograph was published along with the report, “Guinea Panni Aayath Aarkku Vendi Ennariyathe Gopal”, \textit{M}, 03.08.2001, p.5. The picture of the public demonstration of the RCC Protection Forum appeared as part of the news report, “RCC Samrakshikkan Manushyachchangala”, \textit{MM}, 25.09.2001, p.2. The photograph of one of the public interaction sessions of the Parekh Commission also appeared in the press. See \textit{MB}, 10.08.2001, p.13.

When the well collapses appeared, reports on the scientific explanations were accompanied by visual representations too. While coloured rain was reported, the photographs of water samples and microscopic images of the cells in the samples were published. Pictures of the scientists doing experiments and observations were also widely published.

The visual images were a crucial means to communicate the nature of the geological phenomena which were otherwise strange and unknown to the readers. Photographs of cracks on the Mullaperiyar Dam and on the walls of buildings, the collapsed wells, volcano eruptions, devastation caused by the earthquakes, and so on were published in the newspapers. For instance, while the debate over the role of Idukki Dam in recurrently triggering seismic activity in the area was gaining momentum, a photograph of one of the tunnels formed a kilometre away from the dam was published in the Mathrubhumi, to suggest the precariousness of the situation and to woo public attention. The presence of the local public in these visual images was significant; the members of the household as well as neighbours were within the picture frame. Some of the photographs had scientists investigating the cracks while

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44 See for instance, the photographs of the team of scientists appointed by Malayala Manorama visiting the collapsed wells and discussing the subject with scientists and other actors. See the news reports with photographs on 2001 August 12, 13, 15 and 17. Also see the team of scientists from the KSGD examining the collapsed wells at Pavangadu, “Kinar Aprathyakshamakal Bhoomiyyude Puramthodile Chalanam Moolam Ennu Padanam”, MB, 07.07.2001, p.1. In the context of the Mullaperiyar Dam issue, photographs of the research teams from Kerala examining the dam repeatedly appeared in the newspapers. For example, see “Mullaperiyar Daminu Villal: Bhookampam Moolamennu Samsayam”, MB, 16.12.2000, p.1, main news. See “Chuvappumazha: Sastrajnjar Parisodhana Nadathi”, KK, 27.07.2001, p.3 for the CESS scientists examining the samples of red rainwater at Changanacherry.
46 See for instance, the photograph of the Etna volcano in Europe, which showed the pre-eruption fuming. M, 23.07.2001, p.8. This photograph appeared in the newspaper in the context of the incident of the 'fuming' of the hill at Idinjimala. See also the photograph of the Mayon volcano in Philippines, which was argued as causing the coloured rains in Kerala. “Varnamazha: Uravidam Philippines Agni Parvatham”, D, 02.09.2001, p.1.
47 See for a photo feature on the Gujarat earthquake, MM, 29.01.2001, p.12. All the newspapers had widely covered the unfortunate event through visual images.
the local residents were observing scientists ‘doing science’.\textsuperscript{50} Interestingly, photographs quite often depicted women as the local public, in contrast to their total absence from other genres of news as representatives of the publics.\textsuperscript{51}

Nevertheless, certain sub-genres were never effectively utilised by the regional press. The cartoons are a good example. Although the cartoon is a crucial genre in the regional press, there was a dearth of cartoons on the controversies under study.\textsuperscript{52} A few cartoons, however, evoked the tremors and the well collapses metaphorically to articulate political themes and this otherwise influential genre was hardly utilised in the articulation of the scientific controversies.\textsuperscript{53}

\textsuperscript{50} See for instance, the picture that showed the scientists from the CESS collecting water samples from the coloured rain in Changanacherry. Local people were seen in the photograph as curiously watching what the scientists were doing. \textit{KK}, 27.07.2001, p. 3. For a detailed analysis of a similar situation captured in a photograph in which Malinowski, the pioneering colonial anthropologist who was writing inside a tent being silhouetted against the tribal people (the Trobrianders) who peer at him from outside, see Woolgar 1988b. Woolgar’s analysis reveals the complexity of the ‘event’ being captured in the photograph as in the context of our discussion; “Who is doing the observing and who is being observed? The reader observes the observer (Malinowski) at work, but the photograph seems to show that Malinowski is himself the focus of attention of some of the Trobrianders. The observer is the subject of observation from within. In addition, closer inspection of the photograph suggests that some of the natives are looking directly at the camera. Thus, the very observation of the observer-at-work is itself being observed.” (p. 16).

\textsuperscript{51} See for instance, \textit{MM}, 13.08.2001, p.2. In this photograph of the expert team of the \textit{Malayala Manorama} examining a collapsed well, a woman (apparently she was the ‘housewife’) was portrayed as a curious observer. Similarly, in another photograph of a well collapse, a woman was shown as pointing her finger towards the collapsed well, while another woman looking into the well. In the news report that was given with the image, a young woman was mentioned as being entrapped in a collapsing well. “Kottathalam Idinju Yuvathi Kazhuthattam Bhoomiyil Thazhnmu”, \textit{MB}, 15.08.2001, p.1.

\textsuperscript{52} The cartoons often depict political themes in the Malayalam press.

\textsuperscript{53} See the \textit{Kunjamman} cartoon strip by B.M. Gafoor in the \textit{Mathrubhumi} on 08.01.2001 (p.1) and 01.08.2001(p.1). See also the cartoons in the \textit{Deshabhiman} on 20.07.2001 (p.4) and 24.07.2001 (p.9). These were the only representations of the controversies available in the newspapers under study. The absence of science criticism in the genre of cartoons is a problematique that deserves further attention. A good number of cartoons appear in many of the non-Malayalam newspapers that laugh at science in general and particularly at the Indian scientific establishment. The cartoons by the reputed Indian cartoonist R.K. Laxman are good example of the same. The cartoonist writes, “[t]he subject of science is not my cup of tea; but armed as I was with the cartoonist’s licence to be inaccurate and irresponsible, I saw exciting possibilities. \textit{Science Today} [the magazine in which many of his science cartoons appeared] offered an excellent platform for this venture. So I started off drawing cartoons for it on things scientific, or so I thought! Soon I realised that science did not confine itself to cosy labs alone with their physics and chemistry, as I had believed... After I passed off these items quietly as belonging to the sombre world of science I could not prevent the gate crashing of some glaringly unscientific things! ... Yet I have taken the liberty of bringing them under the sacred heading of science in this book because I am convinced that they are bound one day to be scientific certainties in the future.” See the cartoonist’s introduction in Laxman 1982. It is interesting to see how the cartoonist developed the possibilities available within the genre to challenge the boundaries of science by offering
3. The Back Stage: Mobilisation of Resources

In the previous section, we discussed how the newspapers produced science news to constitute a dynamic scientific public sphere when scientific controversies erupted. The maintenance of the front stage of the scientific public sphere, however, cannot be completely captured by analysing the visible organisation of the front stage alone. Front stage management is equally determined by different kinds of negotiations and associations that take place at the backstage. In this section, our emphasis is on this aspect of the scientific public sphere.

3.1. Sources of Information

The production of science news involves a complex process involving stage managers. As mentioned earlier, this process cannot be captured through an analysis of the performance/utterances on the front stage alone. Detailed interviews with the scientists and journalists are used here to capture the backstage activities.

Newspapers relied on various sources to collect ‘raw material’ for the production of science news. The resources collected include scientific explanations, statements of the experts, press notes, photographs, graphs, maps, readings from scientific instruments, specimens, raw scientific data, scientific papers, and so on. Individual scientists as well as the spokespersons of the scientific institutions were important resources for journalists.54 Whenever a geological phenomenon occurred, reporters contacted experts and scientific institutions for the scientific data as well as for the interpretation. For instance, when the tremor occurred on 12 December 2000, all the newspapers approached the CESS, an institution that had great legitimacy as the most authentic source for information on earthquakes in Kerala. The institute was approached for the ‘official’ explanation; the experts from the institute were personally approached by the reporters for detailed information. The personal interviews with the experts were a source of contradictory information and interpretations as scientists had different explanations of the phenomenon. The

54 This was applicable for other actors too. Dr. C.R. Soman, who turned to be an important actor in the RCC controversy pointed out that he got involved in the dispute only after the media persons contacted him because of his expertise in health-related issues. He also felt that the media was approaching him due to his critical views on the medical establishment. He pointed out that the journalists interviewed him mainly to get a ‘dissent note’. It is notable that the actor was quite aware of the role he was supposed to perform in the scientific public sphere. Personal interview with Dr. C.R. Soman, 26.04.2006.
official versions of different institutions often contradicted each other. The personal interviews with scientists helped newspapers construct the incident to suit their general editorial policy.

The process of gathering information from the experts culminated in the discursive construction of the phenomenon on the front stage of the scientific public sphere. The information collected from the experts were translated into a discursive style suitable for the front stage. What the expert ‘originally’ meant to say thereby acquires a totally different set of meanings. This process frequently antagonises the expert who sees him/herself as unrecognisably transformed in the next day’s newspaper report. This ends up in him/her blaming the newspaper for ‘distorting’ what s/he originally uttered and accusing journalists for their ‘lack of scientific understanding’.

An actor was often times not simply an ‘individual’. As representing several actors, he/she was the nodal agency who translated the articulations/interests of these invisible actors so as to suit his/her interests and expertise and finally producing it before the journalists. The experts also represented the interests of scientific institutions, social and professional groups. Their views were crucially informed by their social location, professional status and their location within the scientific field (Bourdieu 1975). Their interpretations were radically shaped by their close observation of the deliberations in the scientific public sphere as members of the reader publics (the audience). This seemingly helped them modify their arguments presented before the journalists.

55 The emergence of the epicentre-intensity controversy that we have discussed in the second chapter is a good example. The explanations and scientific information provided by the CESS and the KSEB research wing contradicted each other and the journalists effectively used these two contradictory sources to create the controversy.

56 In a personal interview with Dr. C.R. Soman (26.04.2006), it was revealed that he had been contacted by several people who found themselves voiceless (some of them were professionally attached to government institutions and therefore did not want to appear in the newspapers. Some of them found themselves incapable of establishing links with the journalists) and shared the resources they had. Dr. Soman himself acknowledged that he was representing the voices of these people, although he processed the resources in his own way in order to develop his opinion on the issue as an expert. At the same time, as revealed by the interviewee, some people urged him to withdraw from the controversy. It indicates that he had to shape his stance critically engaging with a wide range of interest groups who found him suitable for representing them. See Latour (1987; 1988; 1996) for a lucid demonstration of the process of ‘translation’ that occur between actors, from the purview of the Actor Network Theory (ANT). See also Law and Hassard 1999 and Wajcman 2004.

57 The Mullaperiyar Dam issue is a good example that revealed this aspect. ‘Being a scientist working for Kerala Government’, Dr. C.P. Rajendran of the CESS found himself creatively taking into account his regional concerns and the ‘objective realities’ while engaging in the issue and countering the arguments of the scientists from Tamil Nadu. Personal interview with Dr. C.P. Rajendran, 27.04.2006.
The press conferences of the expert teams appointed by the government as well as those conducted by the scientific institutions and individual scientists were a valuable source of information for the journalists. The press notes released by the scientific institutions were considered authentic sources of information. The press conferences functioned as a deliberative space that made possible the interaction between different actors such as the scientists, government officials, politicians and journalists. Reporters also approached scientists who were not directly involved in the controversy, as we have seen earlier. Sometimes, individual scientists who differed with the interpretations of major scientific institutions and reputed scientists approached the reporters to provide their own counter arguments. In the case of RCC controversy, those scientists who differed with their colleagues approached media persons to provide information on the issue, and it was this move of rival scientists that conferred on this event the status of a scientific controversy. As we have seen earlier, newspapers frequently reported such alternative accounts from less authentic sources. Whenever an official team of experts was constituted to probe the scientific aspects of the issues under debate, journalists travelled with the team to obtain first hand information on the matter. This proximity provided an in-camera reportage of the encounter between scientists and other actors, especially the local public. As we have seen in the case study chapters, there were incidents reported in the newspapers wherein the local public confronted the scientists who visited the affected localities for investigations. The sudden eruption of such deliberative moments was well captured by the journalists when they travelled with the expert team.

The journalists and other actors often referred to scientific journals and popular science magazines in the making of science news. The debates in the Western media were passionately followed in order to enrich the deliberations in the

58 The press conference is a rarely studied theme (Bhatia 2006:173). The press conference has its own autonomy as a deliberative space. The analysis of the use of language, discursive strategies, etc., in the press conferences is important in understanding the constitution of the space (ibid).

59 See chapter 4.

60 These are the sources which are not epistemologically legitimised through a deliberative process. Mostly these sources consisted of self-styled experts as well as scientists who work from small, unknown and less established scientific institutions and research areas.

61 In the context of the coloured rain controversy, the alien cell theory as well as the Panspermia theory based explanations published in international journals and popular science magazines were closely followed by the regional press (chapter 3). The research of the Chinese and the Japanese scientists on earthquake prediction was regularly followed by the journalists. In the RIS debate, studies in the context of other dams like Koyna were often invoked in the scientific public sphere. See chapter 2.
scientific public sphere.\textsuperscript{62} Scientific papers and reports prepared by the scientists from India and abroad were referred to by many journalists. Legitimate scientific claims were reinterpreted in diverse ways by the non-scientist actors, to suit their purposes. The internet was a source of information for the journalists and many of the actors.\textsuperscript{63} There were many instances of scientists too relying on the internet to collect preliminary information on the scientific controversy.\textsuperscript{64} Some researchers who lacked acceptance from the scientific community utilised the internet for introducing their research to a wider audience along with the mass media.\textsuperscript{65} The presence of the internet as an easily available source of scientific information for non-scientists eroded the scientists' authority over interpretation to an extent.\textsuperscript{66}

None of these Malayalam newspapers has a science beat like some of the national dailies.\textsuperscript{67} However, there are journalists in the regional press who keep a tab on certain areas of scientific research although they are not exclusively science correspondents.\textsuperscript{68} When an issue related to the area of interest emerges, these journalists play an active role in organising the reports as well as participating in the formulation of the editorial policy of the newspaper.\textsuperscript{69} Most of these journalists have their basic degrees in various sub-disciplines of science.\textsuperscript{70}

\begin{itemize}
  \item \textsuperscript{62} When the RCC clinical trial case was deliberated, the regional press brought in related incidents and debates in the Western media. See chapter 4.
  \item \textsuperscript{63} Many of the journalists whom I interviewed agreed upon their use of the internet as a source of information.
  \item \textsuperscript{64} For example, the CESS scientists who proposed the meteor theory collected information from the internet regarding similar incidents of coloured rains reported in the past in different parts of the world. Personal interview with Dr. V. Sasi Kumar, 27.04.2006. Many other scientists also made explicit their use of internet as a source of information during my interviews.
  \item \textsuperscript{65} See chapter 4 for a detailed discussion on the endeavour of Dr. Godfrey Louis and Dr. Santhosh Kumar to attain scientific acceptance and public appreciation of their postulates. The researchers pointed out that the preliminary debate on the alien cell theory was hosted by websites like World Science (http://www.world-science.net/). Personal interview with Dr. Louis and Dr. Kumar, 23.06.2006.
  \item \textsuperscript{66} Some of the reputed scientists whom I interviewed spoke critically of public attempts to achieve the status of experts, using the internet as a source of scientific information.
  \item \textsuperscript{67} Personal interview with B.R.P. Bhaskar (media analyst and journalist), 12.06.2006. \textit{The Hindu}, for example, has a well-organised science beat. A science beat consists of a team of journalists following the developments in different fields within science and producing science news. The newspaper may have an editor or an editorial team who organise the science content. The 'science and technology' page in \textit{The Hindu} (published every Thursday) presents new developments in contemporary science.
  \item \textsuperscript{68} Personal interviews with P.V. Murukan (Kerala Kaumudi), 12.06.2006 and Sasidharan Mankathil (Mathrubhumi), 26.06.2006.
  \item \textsuperscript{69} Ibid.
  \item \textsuperscript{70} For instance, Sasidharan Mankathil of the Mathrubhumi is a postgraduate in Geology, and he was previously a research associate in a scientific project at the CESS. P.V. Murukan of Kerala Kaumudi cited the names of some of the science reporters of his newspaper and pointed out that they had had at least graduate training in science. Personal interviews with Sasidharan Mankathil (26.06.2006) and P.V. Murukan (12.06.2006).
\end{itemize}
science and technology is apparently a phenomenon that emerged after the 1980s.\textsuperscript{71} The majority of the regional newspapers have a reporter at Thiruvananthapuram, the state capital where most of the prestigious scientific institutions are located, who is assigned to contact these institutions and the scientists when a science-related issue emerges.\textsuperscript{72}

3.2. Professional Associations and Networks

Another important factor regarding the journalistic production of science news is the existence of associations and networks which help the regional press in effective science reporting and thereby facilitate the emergence of a dynamic scientific public sphere. Although the newspapers accessed the above-mentioned multiple sources of scientific information, special networks and channels were used by each newspaper to gather the scientific resources. Some journalists and newspapers had privileged access to certain scientific institutions and scientists. The regional press generally relied on the CESS scientists for 'authentic' information on tremors and well collapses, but the \textit{Mathrubhumi} depended on the KSGD research team led by Dr. K.V. Mohanan as an alternate source.\textsuperscript{73} The RCC clinical trial controversy revealed the associations between the scientists and newspapers, forming two rival coalitions.

This privileged access to certain sources of information and the unique association between certain scientists and journalists had a wider impact on the public. Both the scientists and the journalists benefited from such symbiotic associations.\textsuperscript{74} While the association helped the journalists and newspapers to introduce new twists and turns into the deliberations, the scientists could push their arguments more effectively into the scientific public sphere with the aid of the

\textsuperscript{71} Personal interview with Sasidharan Mankathil (26.06.2006). He opined that it was the graduates in the Malayalam literature who had generally opted for Journalism. In the 1980s and especially in the 1990s this trend changed, and the field of journalism became open to science graduates as well. I was told that there were four journalists in \textit{Mathrubhumi} assigned to follow developments in various field of science on a regular basis.

\textsuperscript{72} Ibid.

\textsuperscript{73} See chapter 2. This became more evident when Dr. Kusala Rajendran and Dr. C.P. Rajendran of the CESS criticised the \textit{Mathrubhumi}'s journalists for their 'distortion' of scientific information. They hinted that they began avoiding reporters from the newspaper, after a few bad experiences of 'distortion' of their explanations. According to them, after this incident the newspaper started taking a stand against them and the CESS in the scientific controversy. Personal interviews conducted with the scientists on 27.04.2006. However, some other scientists from the institute suggested that the \textit{Mathrubhumi} journalists maintained cordial relationship with them. Personal interviews with Dr. V. Sasikumar (27.04.2006) and John Mathai (04.05.2006).

\textsuperscript{74} See the discussion on 'science-media coupling' in chapter 1. See also Weingart 1998, 2002.
journalists. The association with journalists helped scientists acquire public attention and thereby more social acceptance and government funds for their research. There were other interesting aspects linked to this professional symbiosis: at certain moments, the journalist-scientist duo worked together in scientific data collection and analysis. The *Mathrubhumi* collected data regarding collapsing wells from all over the region with the help of its reporters, under the coordination of Sasidharan Mankathil, the journalist, and the CESS scientist, Dr. John Mathai. The vast journalistic machinery of the newspaper was thus used by scientists to collect scientific data. The primary level analysis of the data obtained by using the infrastructure of the newspaper was undertaken by the scientist-journalist duo themselves. There were instances of the scientists relying on the regional press to get primary information about different geological phenomena. In a scientific research paper on the unusual geological incidents in the region, the authors duly mentioned their dependence on daily newspapers for collecting information on such incidents. The scientific research system in Kerala which is poorly staffed necessitated this compensatory mechanism of drawing upon a variety of sources to resolve science-society related issues. These instances show that the science-media relationship is much deeper than the common rhetoric of ‘the media distorting science’ and ‘the bad scientists going to the media’.

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75 Personal interview with Sasidharan Mankathil, 26.06.2006. Dr. John Mathai is a scientist at the Department of Geology, CESS.

76 Ibid. Similarly, the same newspaper played a crucial role in collecting preliminary information about the coloured rains from different parts of the region with the help of their reporters. The information collected by the newspaper was of immense help for the scientists. Personal interview with Dr. V. Sasikumar, 27.04.2006.

77 Ibid.

78 “Information on some of the incidents been obtained from district authorities and through Daily Newspapers after proper evaluation” (N.H. Singh, et al. 2005. “A Database on Occurrence Patterns of Unusual Geological Incidents in Southwest Peninsular India and Its Implication on Future Seismic Activity”. *Acta Geodaetica et Geophysica Hungarica*, 40/1: 69–88. P. 75). Personal interviews with scientists revealed that on many occasions, they gathered primary information from newspaper reports. Personal interviews with Dr. G. Sankar, 04.05.2006 and Dr. V. Sasikumar, 27.04.2006.

79 Such rhetorics have recurrently appeared in the arguments of the scientists and journalists whom I interviewed. It is interesting to see that scientists and journalists associated with each other in diverse creative ways, but used the rhetorical language of the deficit model when they commented on the other professional group. Scientists often blamed the incapability of the journalists in understanding their scientific arguments accurately. The journalists have also been accused of sensationalism. Some scientists warned against the ‘pseudo scientists’ who approach the media for publicity. The journalists have been accused by them for promoting these pseudo scientists. On the contrary, completely oblivious of the internal polysemy of science, the journalists alleged that the scientists of Kerala failed to produce ‘a single, coherent and legitimate explanation’ of the natural phenomena. The scientists have been blamed by the journalists for contradictory statements and for their craving for reputation by appearing in the media.
4. Conclusion

As we have seen here, the scientific public sphere operates on a sophisticated discursive mechanism that makes possible deliberations on the front stage. The backstage has a significant role in keeping the front stage as an active performative space. The case studies showed that the deliberations on the front stage were not entirely regulated or taken over by any single agent, be it the scientific community, the newspaper establishment, or the state. Since the scientific public sphere was constituted through several newspapers, each of them with its own unique characteristics, political perspective and a specific readership presented science news in specific ways. The presentation of news reports on each day in each newspaper had a deep impact on the deliberations in other newspapers on the next day. In this sense, the newspaper-generated scientific public sphere was incessantly reshaped through this dialogical coexistence of many newspapers and their readerships. The feedback from the front stage thus enabled the backstage managers to constantly reorganise the front stage.

A complex network of diverse actors was functional on the backstage, mediated by the journalists. It was through this heterogeneous network that the resources for news production were pooled together. The professional association between the journalists and scientists at the backstage was decisive in shaping the front stage. The scientists and the journalists, as the analysis shows, had their own professional expertises, and both have been used in the production of scientific controversies. Instead of accusing each professional group for not understanding the operations of the other, it is important to study how their symbiotic relationship actively produces the public-science-media engagement in contemporary societies. The next chapter examines how this engagement and its complexities invoke a new political process that democratises science and society.

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80 The professional competition between the newspapers for increasing the readership and thereby attaining more revenue from advertisements is a significant factor behind their eagerness in publishing exclusive news reports.